Special Article

Refer to: Computed tomography—The views of Blue Shield of California. West J Med 127:357-361, Oct 1977

Computed Tomography

The Views of Blue Shield of California

WITH ALMOST EXPLOSIVE FORCE, computed tomography (CT) has burst upon the health care system. Revolutionizing the science of diagnostic imagery, CT has been seen as the most startling development since Dr. Röntgen's initial discovery. Originally, CT was confined to intracranial studies, where the greatest amount of data have been acquired. Subsequently, instruments have been devised for scanning sagittal views of the body. Because of the expense of CT instruments ($400,000 to $600,000), the cost of operation and the proliferation of devices, immediate alarm concerning the impact on the economics of health care was expressed by private and government payors of medical expenses. In the attempt to contain the uninhibited utilization of this novel device, various government agencies and Blue Shield and Blue Cross plans announced that payment would be allowed only for CT brain scans, not for those of the body. Going even further, the Bureau of Health Insurance decreed that, for Medicare beneficiaries, payment could be allowed only when the EMI scanner was used.

Since Health Systems Agencies (HSA) in California, authorized by AB4001, were in the embryonic stage, they were not fully prepared to regulate the appropriate distribution of CT scanners in the state. Currently, the California Department of Health is conducting hearings to help develop guidelines for the issuance of certificate of need.

In an attempt to develop an equitable policy concerning utilization and reimbursement for CT, the Medical Policy Committee of Blue Shield of California, as a fiscal intermediary for Medicare, Medi-Cal (California's Medicaid program) and CHAMPUS and its own standard program, decided to create an ad hoc committee with a distinguished membership.* Three meetings were held by this ad hoc committee and its report was presented at a special meeting of the Medical Policy Committee on January 12, 1977. The following is a summary of the conclusions.

Discussions by Committee

Ralph Schaffarzick, MD, Senior Vice President and Medical Director of Blue Shield of California, opened the first meeting of the ad hoc committee to inform the members of their charge and provided an agenda designed to proceed from the scientific through and including economic factors. The charge of the committee was to develop guidelines for utilization and reimbursement of computed tomography. In addition, the committee developed certain guidelines for distribution of computed tomography, since this has a direct bearing on utilization.

At the onset, Dr. Schaffarzick and Thomas C. Paton, President of Blue Shield of California, described the problems that computed tomography has presented to the private sector and governmental agencies in regard to reimbursement

Adopted by the Blue Shield of California Medical Policy Committee, January 12, 1977, and approved by the Blue Shield of California Board of Trustees, February 16, 1977.

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for diagnostic studies provided by CT scanning. Concerns over the major impact of this new technology were well known to the committee and throughout the discussion it became apparent that utilization of these new procedures has had a major impact on medical economics in general. Therefore, the validity of CT scanning in the medical armament of diagnostic radiology immediately became an issue before the committee. A statement as to the actual validity of CT scanning was proposed. After considerable discussion, a policy statement of the American College of Radiology, with modification, was adopted as follows:

> Computed tomography is a proven radiologic modality, which provides valuable clinical information in the early detection, differentiation, and demarcation of diseases of the head and body.
>
> Abundant documentation of its safety and diagnostic efficacy has been presented in the scientific literature.
>
> It is particularly helpful in solving problems where there is conflicting information from other radiological or laboratory studies.
>
> It frequently does replace other examinations, many of which carry greater risk, discomfort and expense.
>
> Access of the public to computed tomography is essential.

During the meetings considerable discussion took place about areas of practice not directly included in the committee's charge.

First, there is no longer any question that both head and body CT scans are valuable techniques. Both have demonstrated efficacy in examination of the head and body. They are no longer experimental. Every effort should be made to communicate these facts to the appropriate agencies of government.

Second, CT scanning does have a positive as well as negative impact on the cost of medical care. The interrelationship between computed tomography and radionuclide scans, electroencephalography, pneumoencephalography, ventriculography, angiography, posterior fossa pantopaque myelography, diagnostic ultrasound and conventional contrast media result in reductions in the number of traditional tests carried out. There is also a positive impact on total hospital days, since CT does in certain cases replace procedures requiring hospital admission with an outpatient procedure. Unfortunately, no scientific data to evaluate this cost reduction are available and the committee would encourage such research to permit accurate evaluation of the macro-economic impact of computed tomography.

Third, the number of different imaging procedures, such as diagnostic radiology, angiography, ultrasound, nuclear scans and computed tomography imaging, make selection of appropriate studies for a specific case increasingly difficult. *Ideally a physician with expertise in imaging and in charge of all these modalities should consult with the clinician concerning which procedure is best suited in a specific clinical situation.*

Last, the committee believes the major thrust of Blue Shield of California and medicine itself should be in educating the medical profession to utilize CT scanning properly. One must constantly weigh the purpose for obtaining any diagnostic study, and it is probable that the present high rate of utilization of CT scanning will subside as the educational process takes place.

Physicians in their enthusiasm to perfect the depth and accuracy of their diagnosis must re-evaluate the relationship of advancing technical ability in regard to the final outcome of the disease in question. Every physician should apply medical and moral judgment to his decisions with respect to each patient.

Indications for CT Scanning

Head Scan

After review of literature and personal experience of the committee, it was concluded that CT *may be* necessary if the following are present:

A. Symptoms
   1. Headache of significant magnitude (Persistent symptoms after neurological evaluation)
   2. Vertigo
   3. Altered consciousness
   4. Seizures, excluding febrile
   5. Symptoms suggestive of transient ischemic attacks
   6. Dementia

B. Physical Findings
   1. Papilledema, or other signs of increased intracranial pressure
   2. Apraxia or aphasia
   3. Visual field defects
   4. Cerebellar dysfunction signs
   5. Hemiparesis
   6. Other focal neurological signs

C. Unresolved Medical Problems
   1. Vascular
      a. Cerebral infarction
      b. Subarachnoid hemorrhage
   2. Traumatic
      a. Hematoma, subdural or intracerebral hematoma
      b. Orbits
      c. Loss of consciousness or declining neurological status
   3. Neoplastic
      a. Primary brain tumor
      b. Intracranial metastases
   4. Congenital Lesions
      a. Hydrocephalus
      b. Encephaloceles
   5. Cerebral Deterioration
      a. Brain atrophy
      b. Acquired hydrocephalus
      c. Non-infectious, infiltrative disease
   6. Infections of central nervous system
   7. Abnormalities seen on skull x-ray, e.g., calcification

D. Serial studies for documentation of response to treatment
   1. Neoplasm, after surgery, radiation, and/or chemotherapy
   2. Hematoma, arterio-venous malformation
   3. Hydrocephalus, after shunt
   4. Management of brain abscess

It was the opinion of the committee that there were no medical contraindications to the application of a head scan; however, the medical necessity in each case should be judged in relation to the preceding criteria.

Body Scan

Neck. The neck is a difficult area to study. There are too many artifacts which cannot be separated and it was felt proper to deny claims for CT scanning of the neck.

Pleura. CT scanning is particularly useful in the identification of pleural nodules which may escape detection by conventional x-ray studies or radionuclide scans. This may prevent unnecessary thoracotomy for solitary lesions of the lung where metastatic seeding has already occurred in the pleura.

Pulmonary Emboli. There is no advantage to CT scanning in detecting pulmonary emboli. Radionuclide methods are superior.

Lung. All claims for CT scanning of the lung should be reviewed, since conventional x-ray studies and tomography provide excellent studies of the lung. It should be noted that slow scanners are incapable of providing sufficient resolution.

Heart. Claims for studies of the heart should be denied. Because of the rapidity of cardiac motion, CT scanners at present are incapable of studying the heart with any degree of accuracy. (Experimental studies in dogs have shown promise, however, in quantitating the magnitude of myocardial infarction.)

Aorta. Claims for studies of the aorta with CT scanning should be reviewed by a medical consultant. Although aortic arch studies using conventional angiographic methods are invasive, they still provide more accurate information.

Mediastinum. Claims for studies of the mediastinum should be accepted, as CT has been shown to be useful in defining the nature of superior and anterior mediastinal and paramediastinal lesions.

Spine and Spinal Cord. CT scanning for the investigation of syringomyelia is acceptable. All other claims for CT scanning of the spinal cord should be reviewed. Currently, technetium bone scans or myelograms are better procedures for imaging the spine.

Retroperitoneum. CT scanning of this area should be accepted when the suspected diagnosis is an adrenal tumor or retroperitoneal tumor or mass.

Pancreas. Accept CT scanning for pancreatic tumor or pseudocysts; though the discussion by the group did point out B-mode ultrasonic scanning in this area and the other retroperitoneal spaces should be considered effective. Utilization of CT scanning for this area should not be denied.

Liver. Accept claims for studies of the liver. CT scanning and nuclear scanning are complementary to each other. The choice of nuclear scanning or CT scanning must be determined in each individual case.

Kidney. A CT scan should not be the primary modality for kidney study. It should be preceded by an intravenous pyelogram, ultrasonic study, or possibly cyst puncture.

Gallbladder. Studies of the gallbladder and biliary tree seem to be sufficiently accurate to accept

a CT scan of this area in the presence of suspected obstructive jaundice. It would incidentally include the liver and pancreas in the same area.

Abdominal Aorta. Claims for CT scans should be reviewed because ultrasound scanning is easier, less expensive and just as accurate.

Uterus, Ovary, Bladder and Prostate. In this area, CT scanning should be used primarily for staging of tumors and extension of disease; however, it also may be useful in other disease processes in the pelvis, for example, abscesses and cysts.

Extremities. There is no justification at present for the use of CT scanning of the extremities.

Treatment Planning

CT scanning may be necessary for planning radiation therapy of certain tumor masses.

Blue Shield of California believes the previous sections reflect the latest available information on computed tomography. It is realized this level of understanding will change and periodic review of this statement is indicated.

Fees

Various technical articles on cost factors in computed tomography as well as data from claims were considered in recommending the level of payment by Blue Shield of California. The following general principles were adopted:

- The economic life expectancy of current CT models is approximately five years.
- The professional time requirement of each scan varies between 15 minutes and an hour.
- The use of contrast media adds a recognizable cost and risk factor to the procedure.
- Costs in California will be higher than in most other areas of the United States due to higher real estate values, the labor market and the like.
- Costs are based on 2,500 head scans or 1,500 body scans per year if the machine is fully dedicated to specific utilization of specific function.

Appropriate Allocation of CT Scanners

In developing this statement, emergency regulations on computed tomography scanner distribution filed on December 7, 1976, by the Director of the California Department of Health; policy statements on CT scanner distribution by the Board of Directors of the California Association of Neurological Surgeons and the American Academy of Neurology; and procedures being employed in other states to administer certificate of need legislation were reviewed.

No single set of criteria was found to meet the dual requirements of medical need and economic justification. The availability of a CT scanner for emergency diagnostic evaluation of head trauma may require placing scanners in localities where overall utilization will not support the economics of CT scanning. The existence of large regional medical centers may produce numerical relationships between CT scanners and need indicators substantially in excess of established community criteria. This may not indicate excessive utilization if the center in fact provides care well beyond the boundaries of the local community.

It was concluded that economic justification for a CT scanner requires a demand level equivalent to 2,500 annual head scans or 1,500 annual body scans on a fully dedicated unit. The benchmarks that would indicate an appropriate level of demand are:

- An unserved population area of 150,000 for head scans or 300,000 for body scans.
- A hospital with 250 acute care beds unserved by a CT scanner.
- A hospital currently properly utilizing 30,000 general radiography imaging procedures per year.

The following subjective criteria are needed to insure proper utilization of a CT scanner:

- Existence of an adequately trained imaging physician and a well rounded radiographic service.
- Existence of an active neurological or neurosurgical service, or both, involved in the care of intracranial problems available to the facility for support of a head scanner.
- Existence of active medical and surgical services sufficient to treat conditions diagnosed through computed tomography body scans.
- Available technical staffing sufficient to service the unit.

Determination of need should be made at the most local level and exceptions granted with appropriate justification. Each unit should be placed to recognize the geographic as well as the demographic characteristics of the area served as well as the distribution and practice patterns of spe-

cialties utilizing CT scanning. In all instances, CT scanners should be placed in a locality subject to adequate peer review. Location of a unit in an individual physician's office should meet the same distributional criteria as those located in a hospital. The instances where a unit is located other than in or contiguous to a general hospital should be rare because of the interrelationship between CT scanning and other medical services.

Summary

The Blue Shield of California ad hoc committee concluded:

- Computed tomography is a proven radiologic modality, which provides valuable clinical information in the early detection, differentiation, and demarcation of diseases of the head and body.

Abundant documentation of its safety and diagnostic efficacy has been presented in the scientific literature.

It is particularly helpful in solving problems where there is conflicting information from other radiological or laboratory studies.

It frequently does replace other examinations, many of which carry greater risk, discomfort and expense.

Access of the public to computed tomography is essential.

- Both head and body CT scans are valuable, established techniques, no longer experimental.
- CT scanning has a positive and negative impact on the cost of health care.
- Ideally, a physician with expertise in imaging and in charge of all these modalities should consult with the clinician concerning which procedure is best suited in a specific clinical situation.
- Physicians in their enthusiasm to perfect the depth and accuracy of their diagnosis must re-evaluate the relationship of advancing technical ability in regard to the final outcome of the disease in question. Every physician should apply medical and moral judgment to his decisions with respect to each patient.
- Conditions where CT scanning may be indicated are delineated.
- In the determination of the recommendation for the level of payment by Blue Shield of California, certain general principles were adopted.
- Benchmarks to assist in the determination of appropriate allocation of CT scanners were developed.
- This report has been transmitted to the California Department of Health and the Bureau of Health Insurance.